

## CLAIMS

1. A multi-speed transmission comprising:
  - an input shaft;
  - an output shaft;
  - a planetary gear arrangement having first, second, third and
  - 5 fourth planetary gear sets, each planetary gear set having first, second and third members;
  - said input shaft being continuously interconnected with said first member of said first planetary gear set, and said output shaft being continuously interconnected with said second member of said fourth
  - 10 planetary gear set;
  - and said third member of said first planetary gear set being continuously connected with a transmission housing;
  - a first interconnecting member continuously interconnecting said second member of said second planetary gear set with said second member
  - 15 of said third planetary gear set, and a second interconnecting member continuously interconnecting said first member of said third planetary gear set with said first member of said fourth planetary gear set;
  - a first torque-transmitting mechanism selectively interconnecting said second member of said first planetary gear set with said third member of
  - 20 said third planetary gear set;
  - a second torque-transmitting mechanism selectively interconnecting said third member of said second planetary gear set with said transmission housing;
  - a third torque-transmitting mechanism selectively interconnecting
  - 25 said second member of said first planetary gear set with said third member of said second planetary gear set;

a fourth torque-transmitting mechanism selectively interconnecting said first member of said first planetary gear set with said second member of said third planetary gear set;

30           a fifth torque-transmitting mechanism selectively interconnecting said second member of said second planetary gear set with said transmission housing;

          a sixth torque-transmitting mechanism selectively interconnecting said third member of said fourth planetary gear set with said transmission  
35   housing;

          a seventh torque-transmitting mechanism selectively interconnecting said first member of said fourth planetary gear set with said third member of said fourth planetary gear set; and

          said first, second, third, fourth, fifth, sixth and seventh torque-  
40   transmitting mechanisms being engaged in combinations of three to establish seven forward speed ratios and a reverse speed ratio between said input shaft and said output shaft.

2. The transmission of claim 1, wherein said first member of said second planetary gear set and said first member of said third planetary gear set comprise a single elongated ring gear.

3. The transmission of claim 1, wherein said second planetary gear set is a simple planetary gear set, and said third planetary gear set is a compound planetary gear set.

4. The transmission of claim 1, wherein each of said first members is a ring gear, each of said second members is a planet carrier assembly member, and each of said third members is a sun gear.

5. The transmission of claim 1, wherein the transmission is operable through two different sets of six speeds by engaging said sixth or said seventh torque-transmitting mechanism before cycling the transmission through different speed ratios.

6. A multi-speed transmission comprising:

an input shaft;

an output shaft;

a planetary gear arrangement having first, second, third and

5 fourth planetary gear sets, each planetary gear set having a ring gear, a sun gear and a planet carrier assembly member;

said input shaft being continuously interconnected with said ring gear of said first planetary gear set, and said output shaft being continuously interconnected with said planet carrier assembly member of said fourth

10 planetary gear set;

said sun gear of said first planetary gear set being continuously connected with a transmission housing;

a first interconnecting member continuously interconnecting said planet carrier assembly member of said second planetary gear set with said

15 planet carrier assembly member of said third planetary gear set, and a second interconnecting member continuously interconnecting said ring gear of said third planetary gear set with said ring gear of said fourth planetary gear set;

a first torque-transmitting mechanism selectively interconnecting said planet carrier assembly member of said first planetary gear set with said

20 sun gear of said third planetary gear set;

a second torque-transmitting mechanism selectively interconnecting said sun gear of said second planetary gear set with said transmission housing;

25 a third torque-transmitting mechanism selectively interconnecting  
said planet carrier assembly member of said first planetary gear set with said  
sun gear of said second planetary gear set;

a fourth torque-transmitting mechanism selectively  
interconnecting said ring gear of said first planetary gear set with said planet  
carrier assembly member of said third planetary gear set;

30 a fifth torque-transmitting mechanism selectively interconnecting  
said planet carrier assembly member of said second planetary gear set with  
said transmission housing;

a sixth torque-transmitting mechanism selectively interconnecting  
said sun gear of said fourth planetary gear set with said transmission  
35 housing;

a seventh torque-transmitting mechanism selectively  
interconnecting said ring gear of said fourth planetary gear set with said sun  
gear of said fourth planetary gear set; and

40 said first, second, third, fourth, fifth, sixth and seventh torque-  
transmitting mechanisms being engaged in combinations of three to establish  
seven forward speed ratios and a reverse speed ratio between said input shaft  
and said output shaft.

7. The transmission of claim 6, wherein said ring gear of said  
second planetary gear set and said ring gear of said third planetary gear set  
comprise a single elongated ring gear.

8. The transmission of claim 6, wherein said second planetary  
gear set is a simple planetary gear set, and said third planetary gear set is a  
compound planetary gear set.

9. The transmission of claim 6, wherein the transmission is operable through two different sets of six speeds by engaging said sixth or said seventh torque-transmitting mechanism before cycling the transmission through different speed ratios.

10. A dual six-speed transmission comprising:
- an input shaft;
  - an output shaft;
  - a planetary gear arrangement having first, second, third and
  - 5 fourth planetary gear sets, each planetary gear set having first, second and third members;
- said input shaft being continuously interconnected with said first member of said first planetary gear set, and said output shaft being continuously interconnected with said second member of said fourth
- 10 planetary gear set;
- said third member of said first planetary gear set being continuously connected with a transmission housing;
- a first interconnecting member continuously interconnecting said second member of said second planetary gear set with said second member
- 15 of said third planetary gear set, and a second interconnecting member continuously interconnecting said first member of said third planetary gear set with said first member of said fourth planetary gear set;
- a first torque-transmitting mechanism selectively interconnecting said second member of said first planetary gear set with said third member of
- 20 said third planetary gear set;
- a second torque-transmitting mechanism selectively interconnecting said third member of said second planetary gear set with said transmission housing;

25 a third torque-transmitting mechanism selectively interconnecting  
said second member of said first planetary gear set with said third member of  
said second planetary gear set;

a fourth torque-transmitting mechanism selectively  
interconnecting said first member of said first planetary gear set with said  
second member of said third planetary gear set;

30 a fifth torque-transmitting mechanism selectively interconnecting  
said second member of said second planetary gear set with said transmission  
housing;

a sixth torque-transmitting mechanism selectively interconnecting  
said third member of said fourth planetary gear set with said transmission  
35 housing;

a seventh torque-transmitting mechanism selectively  
interconnecting said first member of said fourth planetary gear set with said  
third member of said fourth planetary gear set; and

40 wherein either said sixth or said seventh torque-transmitting  
mechanism is preselected for engagement in a low or high mode, and two of  
said first, second, third, fourth and fifth torque-transmitting mechanisms are  
also selectively engaged to establish six low or high forward speed ratios and  
a reverse speed ratio between said input shaft and said output shaft.

11. The transmission of claim 10, wherein said first member of  
said second planetary gear set and said first member of said third planetary  
gear set comprise a single elongated ring gear.

12. The transmission of claim 10, wherein said second planetary  
gear set is a simple planetary gear set, and said third planetary gear set is a  
compound planetary gear set.

13. The transmission of claim 10, wherein each of said first members is a ring gear, each of said second members is a planet carrier assembly member, and each of said third members is a sun gear.

14. An add-on assembly for attachment to a six-speed transmission having a transmission housing and a plurality of gear members, the add-on assembly comprising:

5 a case enclosing a planetary gear set including a sun gear, a ring gear and a planet carrier assembly member, said case being attachable to the transmission housing;

a low ratio clutch selectively connecting said sun gear to ground;

a high ratio clutch selectively connecting said ring gear to said sun gear;

10 an interconnecting member connecting said ring gear to one of the gear members of the six-speed transmission;

wherein said planet carrier assembly member is connected to an output member; and

15 wherein said low ratio clutch and high ratio clutch are alternatively engageable to convert the six-speed transmission to a seven-speed transmission.